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PALEONTOLOGY.—*Shorter contributions to the paleontology of the Eocene of northwestern Peru: I, Solitary corals. II, Brachiopods. III, Foraminifer Gypsina.*¹ WILLARD BERRY, Johns Hopkins University. (Communicated by JOHN B. REESIDE, JR.)

I, SOLITARY CORALS

It has been my good fortune to find two species of solitary corals belonging to the genera *Flabellum* and *Balanophyllia* in a grayish-brown gritty, calcareous sandstone near Calita Sal, Department of Piura, Peru. Though these corals are not well enough preserved to deserve a specific name they are worthy of record as an interesting part of the fauna. I have correlated the sandstone with the Eocene (probably upper Eocene) Saman conglomerate² because of the occurrence with the corals of the brachiopod *Liothyryna peruviana* Olsson and the foraminifera *Orthophragmina (Discocyliina) peruviana* Cushman, *O. (D.) salensis* W. Berry, *O. (Asteroiacites) calita* W. Berry, and *O. (Astero-discocyliina) stewarti* W. Berry.

It is interesting to note in the Eocene of this area the occurrence of solitary corals associated with the larger foraminifera and a brachiopod, all forms usually considered indicative of fairly clear water. The matrix is rather coarse, the grains attaining a maximum diameter of 1 mm. There is, however, little evidence of sorting, for considerable fine silt or mud is present in the sediments. Some of the cement is calcareous and some of the specimens of *Liothyryna peruviana* are now geodes partly filled with calcite crystals.

¹ Received April 13, 1929.

²A. IDDIGS and A. A. OLSSON. *Geology of northwestern Peru*. Am. Assoc. Petr. Geol. Bull. **12**: 17. 1928.

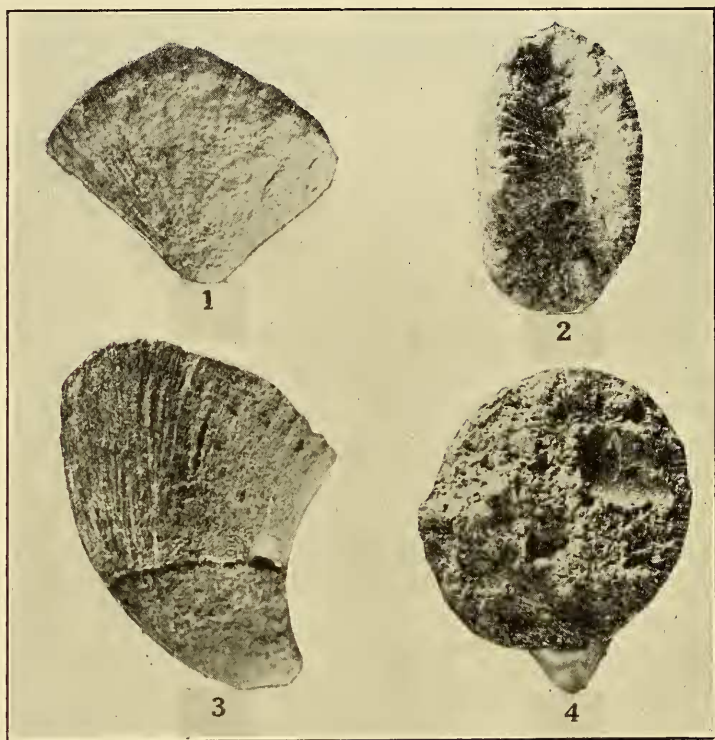
A. A. OLSSON. *Contributions to the Tertiary paleontology of northern Peru, pt. 1, Eocene Mollusca and Brachiopoda*. Bull. Am. Paleont. **14** (52). 1928.

The two corals may be described as follows:

FLABELLUM SP. (Figs. 1, 2)

Corallum attached by a very short pedicle; shape cuneate, compressed; no evidence of wing-like processes, nor of growth lines encircling the corallum. Costae well developed but fine. Septa not clearly shown, as the entire central portion of the corallum is obscured by matrix.

Greatest diameter, 14 mm.; least diameter, 8 mm.; height of corallum, 12 mm.



Figs. 1, 2.—*Flabellum* sp., $\times 3$

Figs. 3, 4.—*Balanophyllia* sp., $\times 3$

Locality: Near Calita Sal, Department of Piura, Peru.

Horizon: Saman conglomerate, Eocene.

I have not given this specimen a specific name because of the lack of knowledge of the septa. In external appearance it may be compared with *F. cuneiforme* var. *wailesi* Conrad, of the Jackson and Vicksburg formations in the Gulf Coastal Plain of the United States. However, the fossil presents so few of the internal features that comparisons are of small value.

BALANOPHYLLIA SP. (Figs. 3, 4)

Corallum elongate, cornute, curved in the plane of the longer transverse axis of the corallum. Costae fine, low, every second one more acute and larger

than the intervening one. Area of attachment small. Septa almost entirely obscured by matrix.

Greatest diameter, 14 mm.; least diameter, 12 mm.; height of corallum, 16 mm.

Locality: Near Calita Sal, Department of Piura, Peru.

Horizon: Saman conglomerate, Eocene.

I have not given this specimen a specific name because of lack of information concerning the interior characters. It may be compared with *B. irrorata* (Conrad) in the external features, but such a comparison has little meaning.

II, BRACHIOPODS

The gritty, brown sandstone near Calita Sal, Department of Piura, Peru, has yielded four species of Brachiopoda, three of which appear to be new. The fourth is a species described originally by Olsson as *Liothyryna peruviana* Olsson from the Saman conglomerate, probably early upper Eocene.³ With the Brachiopoda I found *Nummulites speciosa* W. Berry, originally described from the Saman conglomerate at Negritos, Peru, 50 miles south of Calita Sal, and several species of *Orthophragmina*, also originally described from the Saman conglomerate.

Nowhere else in the extremely thick series of Tertiary sediments found in northern Peru, so far as I know, are any brachiopods or *Orthophragmina* found. In the overlying beds are found many orbitoids, but these all belong to the large genus *Lepidocyclina* and its subgenera.

The new Brachiopoda may be described as follows:

Terebratulina peruviana W. Berry, n. sp.

Figs. 1-4

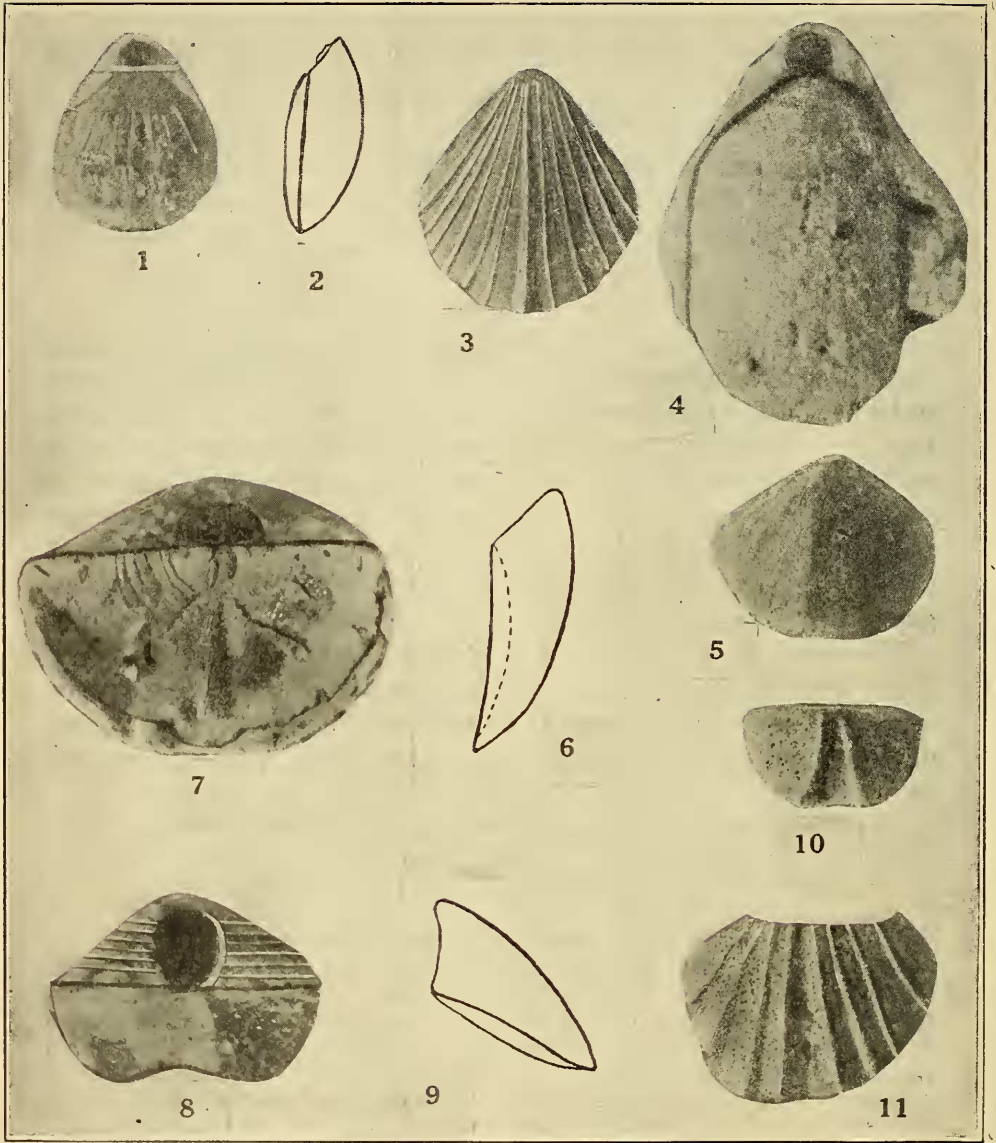
Shell extremely minute, ovate, biconvex, rectimarginate; cardinal extremities slightly auriculate; test capillate, finely punctate. Beak suberect. Foramen large, nearly circular, submesothyrid; deltidial plates disjunct; pedicle collar short. Crura relatively long (poorly preserved), crural process united by a fairly broad ribbon, making the loop into a ring. There is no septum in the dorsal valve.

Length: 1 to 4 mm.; *width:* 1.25 to 3.5 mm.; *thickness:* 1 mm.

T. peruviana is somewhat like *T. pectinoides* v. Koenen, described from the middle Oligocene of Germany,⁴ but differs in the shape and size of the deltidial plates and in the relative abundance of the ribs. It is here given specific rank despite its small size, because if it were the young of a larger form there should certainly be found some of the adult specimens. The only larger brachiopod found in the formation belongs to another genus.

³ A. A. OLSSON. *Contributions to the Tertiary paleontology of northern Peru. Pt. 1. Eocene Mollusca and Brachiopoda.* Bull. Am. Paleont. 14 (52). 1928.

⁴ Abh. Geol. Specialkarte Preussen 10 (6). 1894.



Figs. 1-4.—*Terebratulina peruviana* W. Berry, n. sp. Dorsal aspect; 2, profile; 3, ventral aspect; 4, dorsal aspect of a very large specimen.

Figs. 5-9.—*Argyrothea peruviana* W. Berry, n. sp. 5, Ventral aspect; 6, profile; 7, dorsal aspect; 8, view of cardinal area; 9, profile of Fig. 8.

Figs. 10-11.—*Argyrothea chica* W. Berry, n. sp. 10, Dorsal aspect; 11, ventral aspect.

All figures $\times 12\frac{1}{2}$

Argyrotheca chica W. Berry, n. sp.

Figs. 10, 11

Shell minute, subrectangular to broadly oval; cardinal margin megathyrid; valves biconvex, nearly smooth, the median line of both valves being occupied by a sulcus on either side of which is one wide plication punctations rather fine, very noticeable; growth lines show faintly. Rostrum short, subtruncate. Foramen large, almost hypothyrid, incomplete; deltidial plates small, trigonal; pedicle collar well developed and supported by a heavy median septum which extends forward nearly to the middle of the valve. Crura widely separated, loop long (very poorly preserved).

Length: 2-3 mm.; *width:* 3-4 mm.; *thickness:* 1.5-2 mm.

This species differs from the following in having fewer plicae, more variable size of shell, and better development of the growth lines. I have concluded that it is a distinct species because no larger specimens of the same genus are found in the area.

Argyrotheca peruviana W. Berry, n. sp.

Figs. 5-9

Shell minute, subrectangular to transversely pentagonal; cardinal margin megathyrid; valves biconvex, multiplicate, the median line of both valves being occupied by a sulcus on either sides of which there are five rounded plicae, those of the ventral side being better developed than those of the dorsal side; punctations rather fine, very noticeable. Rostrum short, subtruncate. Foramen very large, submesothyrid, incomplete; deltidial plates small, trigonal; pedicle collar well developed and supported by a median septum which extends nearly to or even a little beyond, the middle of the valve.

Length: 2 mm.; *width:* 3 mm.; *thickness:* 1.5 mm.

A. peruviana is somewhat like *A. beecheri* (Clark), described from beds at Vincentown, New Jersey, long assigned to the Cretaceous but recently placed in the Eocene. *A. peruviana* is smaller, has fewer plicae and much finer punctations than *A. beecheri*.

This is the first record of the genus in the Tertiary of South America and it is interesting to note that it is found most abundantly in the European Tertiary. There are about eleven species from North America and about thirty from Europe.

III, FORAMINIFER GYPSINA

During some years work on the Tertiary section of northern Peru I found twelve specimens of a single species of *Gypsina*. The genus, originally a part of *Tinoporos* (Monfort?) Carpenter and later separated by Carter, contains about a dozen species rather widely scattered geographically. It is found in the present-day seas, usually in the shallow zones of both temperate and tropical areas and, according to Brady, seldom below 400 fathoms. Cushman⁵ gives the range

⁵ J. A. CUSHMAN. *Foraminifera, their classification and economic use*, p. 330, 1928.

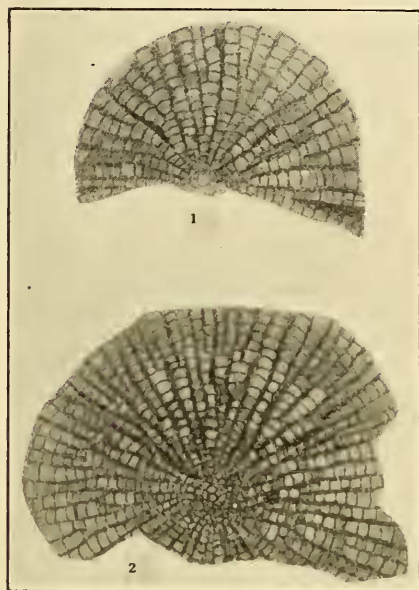
of *Gypsina* as Cretaceous to Recent. I have not been able, however, to find any record which carries it beyond the Tertiary. The species *G. globulus* (Reuss) has been described from the Miocene of Austria, Hungary, Malta, and Jamaica; from the Pliocene of Costa Rica; and the "Tertiary" of Palermo, Bordeaux, and San Domingo. The genus has been considered a chiefly Miocene group and hence it is of interest to describe a species from the Eocene. My material is from the gray-

brown, gritty sandstone at a locality near Calita Sal, Department of Piura, Peru, and is associated with both large and small fossils typical of the Saman conglomerate.

The new species may be described as follows:

Gypsina peruviana W. Berry, n. sp.
(Figs. 1, 2)

Test small, spherical, apparently free; exterior reticulate surface-chambers opening directly to the outside; walls calcareous. Chambers arranged in radial columns, increasing in diameter from the center to the periphery. In the center the chambers are 19.5 microns in radial diameter and as much in cross section, with walls 8 microns thick; and they increase in size to 46 microns in radial diameter and 66 microns in cross section, with walls 15 microns thick, at the periphery of the averaged-size test. These radial columns of chambers each divide into two at about 156 microns



Figs. 1, 2.—*Gypsina peruviana* W. Berry, n. sp. 1, Cross section of large specimen, $\times 35$. 2, Cross section of small specimen, $\times 35$.

from the center, at 234 microns, and again at 390 microns.

Diameter of test 0.9 to 1.67 mm.

G. peruviana may be compared to *G. globulus* (Reuss) in size and in general character of the surface. The interior features, however, are distinctive, particularly the bifurcation of the columns of chambers. In none of the described forms is such a feature mentioned. The division produces a greater number of chambers in a given circle than would be present if the columns did not divide but continued to increase in size enough to maintain the spherical form of the test.